

Architecture Evaluation Product Documentation

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What it is: The architectural evaluation technology is a process that assures that the actual implementation of a software architecture in source code matches specified architectural guidelines in order to produce and maintain quality software. The process is supported by tools that analyze Java or C/C++ code and identifies violations of interactions between components/modules of the software architecture in the implementation.

Features: The architectural evaluation technology is tailorable to your project's specific needs, architectural styles, design patterns, general guidelines, and design rationale. It is possible to analyze the system and identify violations in different levels of abstraction of the architecture.

Benefits: The technology allows your project to quickly check that the source code conforms to the planned architecture. It identifies architectural violations so that they can be corrected and prevents the architecture from degenerating and ensures that the architecture is kept flexible despite software change and evolution. The architectural evaluation technology complements and makes reviews more efficient because it provides a high level picture of the software and can be used to identify areas of the software that might need more attention."

Successes: The approach has been applied in several research projects and one commercial product in Java and it is currently being applied in a telecommunications system and in an automotive embedded system in C/C++. In all cases, the technology allowed the users of the process to quickly identify many violations of pre-defined architectural guidelines. These violations caused the architecture of the software to degenerate and threatened the maintainability and evolvability of the system. Commonly occurring architecture violations were identified. The approach complemented and made code reviews more efficient and targeted because it provided a high level picture of the software that was used to identify areas of the software that needed more attention.

Contexts in which it is best used: The technology is best applied on systems that was designed for maintainability, reusability, flexibility or evolvability in mind. Systems that will benefit the most of the technology include: object-oriented systems based on design patterns, architectural styles and similar concepts and/or that are planned to have a long life. The architecture evaluation is intended for teams that want to assure that their software will continue to conform to its architectural specifications over time and want to avoid code degeneration.

What will a successful collaboration look like?

- a. **What will you as the technology provider do?** We will transfer the technology in three steps. We will analyze your system and capture the planned architecture including information about architectural styles, patterns that might have been used as well as your architectural goals and design rationale. This information will be inputted in our tool. The tool will recover your software system's architecture and identify violations between planned and actual implementation. We will analyze the software system to verify architectural violations and suggest changes. We will feed back the results and give a tutorial on how to use the technology. We will work with you to analyze another version of your software together with you during a second visit. In the last step, we will support you via telephone while you analyze your system.
- b. **What should the development team do?** Prior to the collaboration, you should communicate with us to determine whether your application is a good one for this technology. We also need some input from the architect of the system or some other knowledgeable person before we start the tech transfer process so that we can prepare our part of the project. The details regarding the system's architecture will be worked out during the first visit.

How will you, as technology provider, work together with the development team to ensure a successful collaboration? During the proposal process, we will ensure a good technical and project match with our technology. During the project, we will travel to your site at least twice and work with you. We will setup our technology to fit your needs and to be used by you in the future and will provide telephone support during the project.